

THEFT AND DIVERSION INCIDENT ANALYSIS SYSTEM RADIOLOGICAL APPLICATION

Argonne's THeft And Diversion Incident Analysis System (THADIAS) provides mapping and analytical tools for examining theft, loss, and recovery of radiological devices and sources to support DOE efforts to secure radiological materials worldwide.

■ PROBLEM/OPPORTUNITY

Radiological dispersal devices (RDDs), also known as “dirty bombs,” are weapons that combine radiological materials and a dispersal method (e.g., explosives) to spread radiological contamination. Unlike nuclear weapons, RDDs are relatively unsophisticated weapons that can be built using readily available materials and processes. The potential use of RDDs by terrorists is a grave threat to national security. Prevention efforts center around keeping radiological materials out of the hands of terrorists and other criminal groups.

Radiological materials suitable for use for RDDs can be found in millions of devices commonly used in health care, oil and gas exploration, construction, manufacturing, and many other applications worldwide. In general, such devices are poorly tracked and regulated by authorities. Every year hundreds of devices are reported lost or stolen. In other cases, “orphan” devices or their radiological sources are recovered in scrap yards, border facilities, abandoned factories, and even along roadsides, without documentation to establish ownership or origin. These lost, stolen, or orphan sources could be acquired by terrorists and used to construct an RDD. Tracking losses, thefts, and recoveries of radiological materials and understanding the mechanisms by which control of the material is lost are critical to planning prevention strategies and allocating resources to secure source material. Tracking incidents is difficult, however, because of the large number of incidents and the generally inconsistent and incomplete reporting of these incidents by the press and regulatory agencies.

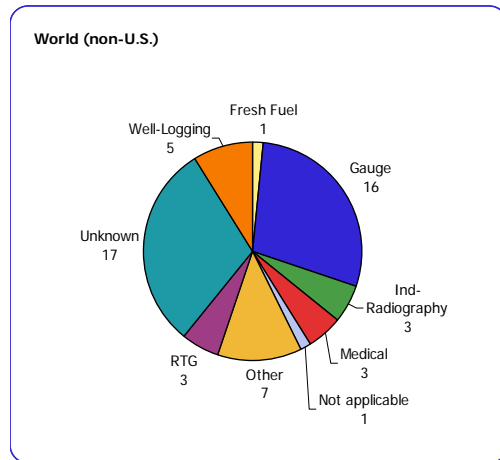


Radiological devices are used worldwide in health care, oil and gas exploration, construction, manufacturing, and many other applications.

■ APPROACH

Argonne developed the THeft And Diversion Incident Analysis System (THADIAS) for the National Nuclear Security Administration's International Radiological Threat Reduction (IRTR) Program to provide a comprehensive incident mapping and analysis tool. Using relational database and geographic information system (GIS) technology, THADIAS stores key information about radiological loss, theft, and recovery incidents, and maps event locations and material transport routes. By using incident accounts from regulatory agencies and the media, the THADIAS analytical process builds case histories by extracting key information from related accounts. THADIAS provides detailed information about each case and shows the progression of the case over time and across the globe. This level of insight is critical to

understanding how material control is lost and regained, as well as to showing how material moves from the points of theft or loss across international borders to points of resale, use, or recovery.



THADIAS analysis provides key data to support efforts to secure radiological materials, such as identifying lost/stolen radiological source types.

THADIAS also supports DOE's development of material protection strategies and identification of materials and geographic areas "at risk" for radiological materials theft and loss. THADIAS contains key information about suspects involved in cases, which helps law enforcement organizations identify links to terrorist or organized crime groups. Through map and data analyses of hundreds of cases, THADIAS reveals "hot spots" of radionuclide theft/loss and trafficking activities, which helps decision makers determine which materials and locations are at greatest risk. Map and data

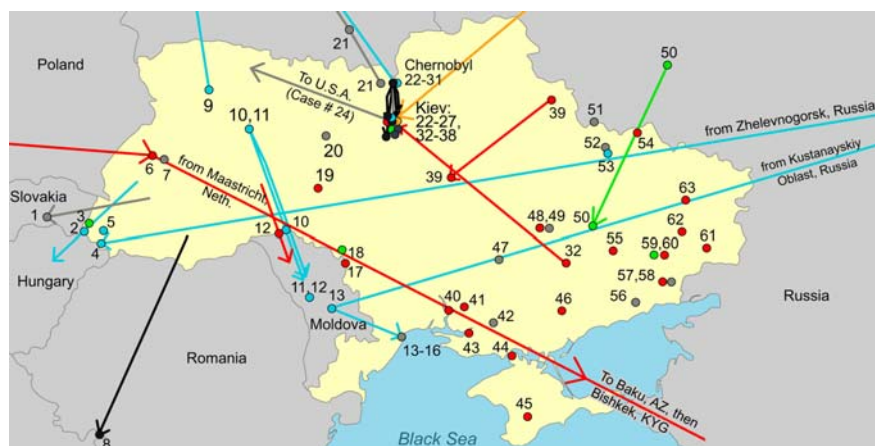
analyses can be performed at any geographical scale from worldwide to city level.

■ RESULTS

THADIAS contains more than 2,000 accounts of radionuclide loss, theft, and recovery cases. New accounts are added continually, and existing cases are updated when necessary, so that the database is kept current. THADIAS products for the IRTR Program include quarterly and annual summary reports, country analyses, and custom maps and reports. The Program uses these products to prioritize threat reduction efforts and to allocate appropriate resources to secure source material. In addition to report products, additional THADIAS analytical capabilities are under development.

■ FUTURE

THADIAS is the IRTR Program's repository for radiological theft and diversion incident data, and it is updated continually in order to serve program needs. Currently, development work is underway to provide THADIAS data and analytical capabilities to program staff via the World Wide Web. In addition, relationships are being established with international law enforcement and regulatory agencies for data exchange and sharing of analytical results and expertise. The methodology employed by THADIAS is also applicable to other illegal trafficking scenarios, such as weapons or biological and chemical threat components.



THADIAS GIS maps reveal "hot spots" for radiological materials theft, loss, recovery, and trafficking.